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ACTIVITIES IN THE UKRAINIAN ACADEMY OF SCIENCES

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ACTIVITIES IN THE UKRAINIAN ACADEMY OF SCIENCES

[Following is a translation of several unsigned reports under the subtitle "In the Presidium of the Academy of Sciences Ukrainian SSR" in the Ukrainian-language journal Dopovidi Akademiyi Nauk Ukrayins'koyi RSR, (Reports of the Academy of Sciences UkSSR), Kiev, No 7, 1962, pp 970-975.]

On the State and Prospects of the Development of
Research in Cybernetics in the Ukraine and Organization of the
Institute of Cybernetics Within the Framework of the Academy of
Sciences UkSSR

The Presidium of the Academy of Sciences UkSSR considered the problem of the condition and prospects of the development of research in cybernetics in the Ukraine.

The Presidium noted that in recent years cybernetics experienced extraordinary growth, being a new branch of science of great importance to many fields of the national economy; the results of cybernetics are used in the automation of technological processes in industry: in planned economy activities and operational management of enterprises and in the national economy as a whole. Cybernetics is assuming a growing importance in biology, medicine, and agriculture.

In the Ukraine basic research in the field of cybernetics is concentrated in the Computer Center of the Acad Sci UkSSR, which actually created the theory of digital automats, a theory of fundamental importance in designing cybernetic systems, in the synthesis of electronic computers; also, we are successfully developing problems of mathematical linguistics and theory of image recognition. Algorithms of control of some industrial processes have been introduced. Great economic advantages are gained from the introduction into practice of plans and projects of methods of solving problems of economic cybernetics, developed by the Computer Center. Methods of solving problems of mathematical physics are successfully introduced and developed. Research has been developed for the establishment of physical foundations of cybernetic systems. Research in biological cybernetics occupies a place of great importance in the work of the Center.

Simultaneously with the Computer Center Acad Sci UkSSR, research in cybernetics is conducted in a number of other institutions of the Academy of Sciences UkSSR. The Institute of Electrical Engineering is researching theoretical problems of control systems which are self-tuning and self-organizing, and algorithms and programs are developed for the solution of problems of designing elec-

trical power systems. The Institute of Mathematics is developing methods of solving problems of applied mathematics and physics by means of electronic computers. Research on individual problems cybernetics is also conducted in the following institutes: Casting, Mining, Radio Engineering Problems, Physiology, and in the Poltava Gravimetric Observatory.

A number of investigations is conducted in cybernetics by non-academic scientific research institutions and higher educational institutions in the Ukraine. Thus, the Institute of Automation of the Gosplan U.S.S.R. and its branch in Lisichansk are developing research on the theory of control of manufacturing processes. The Kiev State University investigates problems of mathematical linguistics and methods of mechanical solution of problems of mathematics, mechanics and physics. At the University of Dnepropetrovsk studies are made of some problems of translation and building of information languages, as well as solving problems of construction mechanics and theory of elasticity by means of electronic computers. Some work in the field of cybernetics is also conducted at the universities of L'viv and Odessa, and at the polytechnical institutes of Kiev, L'viv and Khar'kov.

Considerable work of coordinating scientific research and introduction into practice of completed tasks in cybernetics was accomplished by the Scientific Council on Cybernetics of the Presidium of the USSR which established close contacts with all organizations in the republic and business contacts with a number of Soviet and foreign institutions doing research in cybernetics.

Nevertheless, in spite of the extreme urgency of scientific research in cybernetics, the scope of this work is still insignificant. The development of research in cybernetics is delayed due to an inadequate material-technical base and a scattering of experts and funds.

Science and the national economy in the present stage are in need of the establishment of a scientific institution which would lead the way in cybernetics, and unite and direct the efforts of scientists in various specialties and funds toward the solution of cardinal problems in the science of cybernetics. For this purpose, the Presidium deemed it advisable to establish a Cybernetics Center in 1965-1966, which would embrace the following scientific research institutes: Institute of Theoretical and Economic Cybernetics; Institute of Engineering Cybernetics and Mathematical Machines; Institute of Biological Cybernetics; Institute of Physical Principles of Cyber-

netics, and Computing Center.

The Presidium of the Acad Sci UkSSR approved the steps taken by the Scientific Council on cybernetics and recommended that it further concentrate its scientific efforts on ensuring a broad development of scientific research in the Ukraine in the direction set forth in the future plan of scientific research in cybernetics for the 1962-1980 period: theoretical principles of cybernetics; theory of electronic computers; engineering means of cybernetics and investigation of operations; engineering cybernetics, biological cybernetics, computing cybernetics, and new applications of electronic computers.

The Presidium of the Acad Sci UkSSR passed a resolution on the establishment within the Department of Physico-mathematical Sciences of the Acad Sci UkSSR of an Institute of Cybernetics and to merge with it the Computer Center of the Acad Sci UkSSR and the experimental-production shops.

The Institute of Cybernetics will be charged with the following principal scientific duties: development of theoretical problems of cybernetics - the general theory of automata, theory of algorithms, general theory of systems which are self-organizing; development of problems of economic cybernetics - theory of linear and dynamic planning, method of investigating operations, mathematical

statistics and theory of games; development of problems of engineering cybernetics - general theory of technical cybernetic systems, theory of automatic control and theory of dynamic systems, algorithimization of production processes and theoretical principles of control machines in systems of direct and remote control of objects; development of problems of biological cybernetics - theory of transmission and processing of information in the nervous systems of humans and animals, electrophysiology of nerve cells, theory of control of principal functions and organs of living organisms, bioelectrostimulation, automatic diagnostics, modelling the mechanism of heredity and processes of evolution; development of physical principles of the establishment of cybernetic systems, elements for the establishment of discrete logical systems, principles of the organization of large systems of discrete and analogue components, input and output attachments which provide for an organic communication between man and machine in complex control systems; practical aid to the national economy in matters of automation and control by the creation and introduction of cybernetic methods and machines; introduction of computing and organization of broad scientific research propaganda and information.

**Organization of Scientific Research
and Training of Personnel by the Institutes
of the Academy of Sciences UkSSR together
with Higher Educational Institutions of the UkSSR**

In the successful realization of the historical tasks of creating a material-technical base for communism, science plays an important part. The scientists face an important task: to concentrate their efforts on the development of future scientific and scientific-engineering problems which will contribute to the improvement of the economy and culture of the country.

The scientific institutions of the Ac Sci UkSSR and higher educational institutions of the Ukraine will play an important part in the future development of science in the republic, but unfortunately, there is no close scientific contact among them. Science is artificially divided between the academic and higher education part, which does not contribute to the mobilization of the efforts of scientists in the interests of progressive Soviet science.

Some measures have been taken in recent years to unite the creative efforts of scientific workers of the Ac Sci UkSSR and of the higher educational institutions of

the republic in the matter of joint work on developing scientific problems and training personnel.

The Computer Center of the Acad Sci UkrSSR together with Kiev University have established at the University a scientific laboratory of mathematical linguistics; scientific workers of the Institute of Radio Engineering Problems of the Acad Sci UkrSSR are working on important scientific problems together with the Chair of Radio Transmission Instruments of Kiev Polytechnical Institute; the Institute of Metaloceramics and Special Alloys of the Acad Sci UkrSSR actually provides full training of young experts in the field of powder metallurgy at Kiev State University; and scientists of the Computing Center of the Acad Sci UkrSSR take an active part in training experts in cybernetics at Kiev State University. Such cooperation contributes to the solution of problems facing scientific research institutes and schools of higher education.

Nevertheless the Academy of Sciences UkrSSR and the institutions of higher education of the Ministry of Higher and Secondary Specialized Education UkrSSR are still inadequately utilizing the existing possibilities of organizing joint scientific research and training personnel, particularly for the institutes of the Acad Sci UkrSSR.

The scientific institutions of the Acad Sci UkrSSR

employ 263 doctors and 1500 candidates of sciences, and the higher schools of the Ministry of Higher and Secondary Specialized Education UkSSR - 428 doctors and 4457 candidates of sciences, but actually these teams of scientists work separate from each other, without adequate coordination on the most important problems.

The role of the Acad Sci UkSSR as a scientific center is still inadequate to unify creatively the teams of different scientific institutions, and coordinate the development of science in the republic, including higher educational institutions. Scientific councils on important problems are improperly directing scientific work in educational institutions on appropriate problems, and fail to develop resolution on the development of science in higher educational institutions, therefore the creative opportunities of scientists working in the latter are not sufficiently utilized. The scientific-experimental base of the respective institutes and educational institutions should be more efficiently utilized by conducting joint investigations according to commonly agreed upon plans, organization of joint undertakings by groups, laboratories working on specific problems, etc.

The most expedient organizational forms of training young scientific personnel for the Acad Sci UkSSR by means

of broad inclusion of students of higher courses in research work in the laboratories of the institutes of the Acad Sci UkSSR are not as yet being realized; this would contribute to an acceleration of the rate and improvement of the quality of training of students.

The plan of training young experts and scientists of secondary and higher qualifications is not coordinated between the Acad Sci UkSSR and the Ministry of Higher and Secondary Specialized Education. In recent years scientists of the Acad Sci UkSSR have abandoned reading special courses of lectures, and supervision of seminars and science groups.

The Presidium of the Acad Sci UkSSR passed a broad resolution on this matter.

A memorandum was approved on the cooperation and strengthening of contacts among the scientific institute of the Acad Sci UkSSR and higher educational institutions

of the Ministry of Higher and Secondary Specialized Education and Ministry of Education UkSSR in the field of improving the training of personnel and development of scientific work.

It was recommended that the Department of Physical and Mathematical, Chemical, Geological, Engineering, Biological and Social Sciences of the Acad Sci UkSSR

establish direct contacts with the respective chairs of the higher educational institutions of the republic for the purpose of coordinating common scientific problems, and determining the most expedient ways of continued broadening of cooperation among the scientists of the Acad Sci UkSSR and higher educational institutions (organization of joint scientific research groups, problem laboratories, etc.).

The Presidium of the Acad Sci UkSSR also passed resolutions on other matter associated with the strengthening of cooperation of the Academy and higher educational institutions of the republic.

The State, Prospects of Development, and Trend of the Institute of Chemistry of Polymers and Monomers of the Academy of Sciences UkSSR

The Presidium of the Acad Sci UkSSR heard and discussed a report of the Director of the Institute of Chemistry of Polymers and Monomers, Acad Sci UkSSR, Corresponding Member of the Acad Sci UkSSR, K. A. Korniyev, on the state, prospects of development, and scientific trend of the institute.

The Presidium noted that the Institute of Chemistry

of Polymers and Monomers of the Acad. Sci. USSR, established in 1959 for the purpose of conducting scientific research in the field of chemistry and physics and high-molecular compounds, completed considerable work during the period of its existence in researching the conditions of synthesis, polymerizing and copolymerizing isocyanates; determination has been made of the effect of increase of thermomechanical properties of copolymers; together with the Physicochemical Institute imeni Karpov (Moscow), it has begun work on the practical utilization of the result of investigations; it has developed effective methods of deep cleansing of caprolactane and obtaining capron in powder form; it has made a general investigation of the technology of industrial petroleum and gas condensates of the USSR; it has developed a method of appraisal of resources of medium-molecular paraffins and investigated the possibility of isolating olefins by the method of "molecular sieves," it has completed work and began industrial tests at the Bagleysk Coke-Chemical Plant of applying a hydrophobic polymer film on the walls of coal bunkers.

Along with this, the Presidium pointed to a serious shortcoming in the work of the Institute - the lack of a clear profile which would make it possible to concen-

trate the efforts of its personnel on investigating a limited number of the most important problems. The Laboratory of Physico-Chemistry of the Institute fails to maintain satisfactory contacts with the synthetic laboratories of the Institute, and, moreover, has not determined its own problems for development. The processing group engages in individual fortuitous tasks of a nonscientific nature. The Institute does nothing about introducing its result into production.

The Presidium of the Acad Sci USSR approved the following principal trends of scientific research for the Institute of Chemistry of Polymers and Monomers Acad Scien USSR:

a) Synthesis of new polymers, particularly heat resistant and ion-exchanging tars and polymer materials for machine building;

b) Development of the theoretical fundamentals of processes of the manufacture of polymer materials on the base of broad development of physical and physico-chemical investigations;

c) Development of research on the isolation and catalytic processing of carbohydrates for the purpose of obtaining monomers.

The Presidium charged the Institute of Chemistry of

Polymers and Monomers to achieve during 1962 a correspondence of the structure of the Institute with the above listed scientific trends and to provide in the plan for 1963 the introduction and experimental-industrial tests of the result of scientific research; in planning themes for 1963 and following years to provide for compulsory scientific research work on the establishment of a technology and engineering plans for recommendation to industry; improve cooperative work with the institutions of the Acad Sci UkSSR which are engaged in the field of synthesis and research of polymer materials.

In order to step up work in physics and physico-chemistry of polymers in the Institute of Chemistry of Polymers and Monomers Acad Sci UkSSR, the Director of the Institute of General and Inorganic Chemistry Acad Sci UkSSR, Academician of the Acad Sci UkSSR Yu. K. Delimars'kiy has been ordered to transfer by 1 June 1962 to the Institute of Chemistry of Polymers and Monomers, the group of rheology of the Institute of General and Inorganic Chemistry Acad Sci UkSSR with the corresponding staff.

In addition, the Presidium approved the plan of scientific research of the Institute of Physical Chemistry Acad Sci UkSSR in the field of chemistry of poly-

nars and directed the Institute to concentrate on the theory of the chemical structure of polymer compounds, radiation-chemistry research and the study of the mechanism of autooxydation of polymers.

Stepping up Scientific Research on Problems
of Electrification and Automation of Production Processes

The Presidium of the Academy of Sciences URSR heard and discussed a report of the Director of the Institute of Electrical Engineering, Doctor of Technical Sciences O. M. Milyakh on the continued development of scientific research on problems of electrification and automation of production processes.

The Presidium noted that in recent years the Institute of Electrical Engineering obtained a number of important scientific results on problems of the theory of stability of complex electric power systems, automatic control of the excitation of synchronous machines, use of computer engineering for the calculation of normal and emergency regimes of electric power systems, methods of protecting electric power systems, development of the theory of electronic machines, development of condensation motors, the KHD theory of generators, theory and

and design of contactless equipment for automation, electric and magnetic measurements, theory of invariance and extreme control, series of machines for condenser and press welding, etc. The Institute is broadening its contacts with industry; many developments of the Institute have been introduced into the national economy. The Institute has highly skilled scientific personnel and engages in work of training scientists in all directions of the Institute's activities.

Simultaneously the Presidium of the Acad Sci U.S.S.R. believes that the scope of the work and rate of scientific research of the Institute of Electrical Engineering is still inadequate and does not answer the requirements of the 22nd Congress of the CPSU on the development of activities in the field of electric power, electrification, and comprehensive automation of industrial processes. The Institute has not put sufficient effort into the work of scientists toward the solution of theoretical and practical problems in these areas of research.

The Presidium of the Acad Sci U.S.S.R. approved the proposal of the Institute of Electrical Engineering and Bureau of the Department of Engineering Sciences Acad Sci U.S.S.R. on the further development of scientific research and directing the principal efforts of scientific personnel

toward the following comprehensive problems: electric power engineering and electrification; automation and mechanization of industrial processes and methods of direct transformation of thermal energy into electric.

The Presidium passed a resolution on the reorganization of existing laboratories of the Institute of Electrical Engineering into the following departments: Electrical Machines and Power Transmission; Theoretical Electrical Engineering; and Electrical and Magnetic Measurements.

In order to concentrate in the Institute of Electrical Engineering all the forces in the field of automation and to improve the work in automation to the highest level of modern science, and broadening the introduction of new achievements into production, the Presidium of the Acad. Scienc. USSR passed a resolution on the organization of a department of technical cybernetics on the base of the laboratory of automatic control of industrial processes.

Organization of a Supporting Group

of the Academic Institute in Hospital

The sector of medical electronics of the Institute of Radio Engineering Problems developed a number of new

medical instruments using ultrasonic oscillations and electrohydraulic effect: these are an ultrasonic instrument for wide investigation of soft tissue, an instrument for investigating the action of the heart (ultrasonic cardiograph), a number of variants of an apparatus for crushing gallstones in the bladder by means of electrohydraulic shock, etc.

Since 1959 these instruments have been successfully tested clinically at the Kiev Clinical Hospital imeni October Revolution.

The Presidium of the Acad Sci UkSSR passed a resolution on the organization in this hospital of a Supporting Group of the Institute of Radio Engineering Problems for the purpose of introducing and checking medical electronic instruments developed by the Institute.

New Departments and Laboratories

1. The Presidium of the Acad Sci UkSSR passed a resolution on the organization within the Institute of Electric Welding imeni Ye. O. Paton of the Acad Sci UkSSR of a laboratory of welding electrodes on the base of the nonstructural laboratory of the department of fusion and welding materials.

The principal purpose of the laboratory is research

of metallurgical problems of welding by covered electrodes, research of methods of welding by powdered wire, development of new welding electrodes, powder wires, research of technology of production of welding electrodes and powder wire.

2. For the purpose of ensuring the development of basic themes on the principal problems of linguistics:

"Rules governing the development of national languages in association with the development of socialist nations,"

and "Rules governing the development of national literary languages in connection with the historical development of spoken languages and dialects," the Presidium of the Acad Sci UkSSR passed a resolution on the establishment on

the base of the Department of the Ukrainian Languages of the Institute of Linguistics imeni O. O. Potebnya, of two departments: Department of Modern Ukrainian (director Academician^{of} the Acad Sci UkSSR I. K. Bilodid), the purpose of which is the development of the problem "Rules governing national languages in association with the development of socialist nations," and Department of the History of the Ukrainian Language (director, Candidate of Philological Sciences E. K. Tsilyuko), the purpose of which is the development of the theme "Rules governing the development of literary languages in association with the

historical development of spoken languages and dialects."

In order to make precise the new profile of the department of interpretative and similar dictionaries, the Presidium of the Acad Sci UkSSR passed a resolution on the reorganization of this department into a department of dictionaries of the Ukrainian language, the purpose of which will be the preparation of dictionaries of the Ukrainian language.

3. The Presidium passed a resolution on the establishment within the Council on the Study of the Productive Forces of the UkSSR (Acad Sci UkSSR) of a department of economic cybernetics, and entrusted it with the development of material required for the application of economic cybernetics in the solution of problems of the distribution of industries of the leading branches of the national economy and optimization of economic associations and freight movement.

**Bonuses for Work of Design and Introduction
of New Engineering Methods**

The Presidium of the Academy of Sciences UkSSR awarded prizes from the Centralized Fund of the Acad Sci UkSSR for the following work performed in 1960-1961:

In the Institute of Metallophysics

2. Research of the mechanism of plastic deformation of nickel and nickel with alloying admixtures at different stages of creep depending on testing conditions . 1,000 rb.

3. Development of technology of production of plastic chromium.....3,000 rb.

In the Institute of Electric Welding

Imeni Ye. O. Paton

4. Mechanization of welding in the building of cement plants..... 10,000 rb.

5. Development of method of welding in a medium of carbonic gas, and development of technology of welding and welding equipment and broad introduction of this method in industry..... 15,000 rb.

In the Institute of Electrical Engineering

6. Development and introduction of new welding methods and technology in machine building..... 6,000 rb.

In the Institute of Powder Metallurgy and

Special Alloys

7. Introduction of technology of conversion of natural gas and operation of combined automatic oven 2500 rb.

8. Investigation of capillary properties of molten metals and alloys and their part in the processes of the formation of metaloceramic bodies.....5,000 rb.

Miscellaneous Announcements

The Presidium of the Acad Scienc UkSSR passed a resolution on the publication of a one-volume collection of the scientific works of Academician of the Acad Sci UkSSR, A.A. Sapyehin. A committee has been approved on the preparation for printing of the works of A. A. Sapyehin, headed by Academician Acad Scienc UkSSR, D. K. Zerov.

Pursuant to the decree of the Minister of Higher and Secondary Specialized Education USSR, the Institute of History of the Acad Sci UkSSR has been granted permission to accept for defense candidates' dissertations and to award the degree of Candidate of Historical Sciences in the following specialties: History of the USSR; History of the UkSSR.

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